

Nestin expression in cultivated mesenchymal stem cells : regulation and potential role in their neural differentiation.

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Bone marrow stromal cells can differentiate into many types of mesenchymal cells, i.e. osteocyte, chondrocyte, fibroblast and adipocyte, but can also differentiate into non-mesenchymal cell, i.e. neural cells in appropriate in vivo experimental conditions (*Kopen and al.*, PNAS, **96**, 10711, 1999, *Brazelton and al.*, Science, **290**, 1175, 2000, *Mezey and al.*, Science, **290**, 1179, 2000).

In neurological disorders, such as Alzheimer's and Parkinson's diseases, auto-transplantation of neural cell types derived from mesenchymal stem cells offers the potential of replacing lost cells and recovering lost functions.

Nestin is an intermediate filament protein predominantly expressed by neural stem cells and is used to identify neural progenitor. In this study, we demonstrate that cultured rat mesenchymal stem cells (rMSC) can express nestin in appropriate conditions. Two factors contribute to the regulation of nestin expression by rMSC : 1) the presence of serum-derived components in the culture medium which repress nestin expression and 2) the cell's number of passages. LPA and thrombin mimic this serum effect. Furthermore, when nestin-positive cells are trypsinized and resuspended into culture conditions used for neural stem cells (NSC), sphere formation is observed. Likewise, by co-cultivating nestin-positive rMSC with NSC derived from green mouse, heterogenous spheres were obtained. When those heterogenous spheres are placed on polyornithine-coated surfaces, a differentiation of some rMSC into GFAP-positive cells occurs. These results indicate that nestin expression might be a pre-requisite for the acquisition by rMSC of the capacity to differentiate into some neural cell types.